4. PRODUCTION, IMPORT/EXPORT, USE, AND DISPOSAL

4.1 PRODUCTION

1,1,2,2-Tetrachloroethane as an end-product was formerly produced in the United States only by the Specialty Materials Division of Eagle-Picher Industries in Lenexa, Kansas (SRI 1988). By the late 198Os, this facility had been sold to the Vulcan Materials Company, and production was discontinued at the Kansas facilities (Montgomery and Welkom 1990; SRI 1993). Since the late 1980s no production figures can be found. Approximately 440 million pounds (199.5 million kg) of 1,1,2,2-tetrachloroethane were produced in the United States in 1967 (Konietzko 1984). Production declined markedly thereafter, falling to an estimated 34 million pounds (15.4 million kg) by 1974.

Commercial production of 1,1,2,2-tetrachloroethane as an end-product has apparently ceased in the United States. This parallels patterns in Canada, where the last plant to manufacture 1,1,2,2-tetrachloroethane as an end-product ceased operations by 1985 (CEPA 1993). Any remaining production in the United States or Canada at the present time would involve 1,1,2,2-tetrachloroethane generated for on-site uses as a chemical intermediate, as a trace constituent in other chemicals, or as part of a waste stream in releases to the environment.

1,1,2,2-Tetrachloroethane can be produced by the catalytic addition of chlorine to acetylene (HSDB 1996; IARC 1979); it may also be produced by the direct chlorination or oxychlorination of ethylene (Archer 1979). In most cases 1,1,2,2-tetrachloroethylene was not isolated to form an end-product, but was immediately thermally cracked to yield desired chemicals such as trichloroethylene, tetrachloroethylene, and 1,2-dichloroethylene (Archer 1979). 1,1,2,2-Tetrachloroethane may be produced as a byproduct in the manufacture of chemicals such as trichlorethylene from acetylene (HSDB 1994). Section 4.3 summarizes information on several chemicals in which 1,1,2,2-tetrachloroethane can appear as a trace constituent.

Table 4-l lists the facilities in each state that process 1,1,2,2-tetrachloroethane, the intended use, and the range of maximum amounts of 1,1,2,2-tetrachloroethane that are stored on site. Current production is for on-site uses or as a by-product, so that the phrase “manufacture” in the table heading does not imply production for sale as a commercial end-product. The data listed in Table 4-l are derived from the Toxics Release Inventory (TRI) and refer to facilities operating in 1993 (TR193 1995). Only

Table 4-1. Facilities That Manufacture or Process 1,1,2,2-Tetrachloroethane

Facility	Location[a]	Range of maximum amounts on site in pounds	Activities and uses
WESTLAKE MONOMERS CORP.	CALVERT CITY, KY	100,000-999,999	Produce; For on-site use/processing; As a reactant
VULCAN MATERIALS CO.	GEISMAR, LA	10,000-99,999	Produce; For on-site use/processing; As a by-product; As a reactant
BORDEN CHEMICALS & PLASTICS	GEISMAR, LA	1,000-9,999	Produce; For on-site use/processing; As an impurity; As a reactant
PPG IND. INC.	LAKE CHARLES, LA	1,000,000-9,999,999	Produce; As a by-product; As an impurity; As a reactant
VISTA CHEMICAL CO.	WESTLAKE, LA	1,000-9,999	Produce; As a by-product
FORMOSA PLASTICS CORP.	BATON ROUGE, LA	1,000-9,999	Produce; As a by-product; As an impurity
NA	LA	100,000-999,999	Produce; As a by-product
DOW CHEMICAL CO.	PLAQUEMINE, LA	100,000-999,999	Produce; As a by-product; As a reactant; Ancillary uses
MERCK & CO. INC.	RAHWAY, NJ	10,000-99,999	As a chemical processing aid
HARRELL IND. INC.	ROCK HILL, SC	10,000-99,999	As a formulation component; In repackaging only
TENNESSEE EASTMAN DIV.	KINGSPORT, TN	10,000-99,999	As a formulation component
DOW CHEMICAL CO.	FREEPORT, TX	1,000,000-9,999,999	Produce; For on-site use/processing; As a by-product; As an impurity; As a reactant
FORMOSA PLASTICS CORP.	POINT COMFORT, TX	10,000-99,999	Produce; As a by-product; As an impurity
OCCIDENTAL CHEMICAL CORP.	DEER PARK, TX	10,000-99,999	Produce; As a by-product
OCCIDENTAL CHEMICAL CORP.	GREGORY, TX	1,000-9,999	Produce; As a by-product

Source: TRI93 1995

[a] Post office state abbreviations used

NA = not available

certain types of facilities are legally required to report, and therefore, this is not an exhaustive list. Based on the information in Table 4-1, there are 15 facilities that reported having some on-site generation of 1,1,2,2-tetrachloroethane, with estimates for the amounts stored on-site as a by-product, chemical intermediate, or impurity showing extremely large differences among different facilities (TR193 1995).

4.2 IMPORT/EXPORT

Limited data pertaining to the import or export of 1,1,2,2-tetrachloroethane were located in the available literature. Imports in 1982 totaled 65,500 kg (HSDB 1996). Present tariff-setting and record-keeping practices combine 1,1,2,2-tetrachloroethane with other chemicals (USITC 1994). Because there is no end-product production or uses of 1,1,2,2-tetrachloroethane, current import and export levels may be assumed to be negligible.

4.3 USE

In the past, the major use for 1,1,2,2-tetrachloroethane was in the production of trichloroethylene, tetrachloroethylene, and 1,2-dichloroethylene (Archer 1979). It was also used as a solvent, in cleaning and degreasing metals, in paint removers, varnishes and lacquers, in photographic films, and as an extractant for oils and fats (Hawley 1981). Although at one time it could be used as an insecticide, fumigant, and weedkiller (Hawley 1981), it presently is not registered for any of these purposes. It was once used as an ingredient in an insect repellent, but registration was canceled in the late 1970s. With the development of new processes for manufacturing chlorinated ethylenes, the manufacture of 1,1,2,2-tetrachloroethane as a commercially marketed end-product has steadily declined in the United States and now appears to have ceased (HSDB 1996). A similar trend is reported in Canada (CEPA 1993).

1,1,2,2-Tetrachloroethane can still appear as a chemical intermediate in the production of-a variety of other common chemicals. Trace amounts of 1,1,2,2-tetrachloroethane may be introduced into the environment as these other chemicals are produced, or it may appear as a minor impurity in the endproducts. Therefore, it is helpful to know how some of these other chemicals are related to 1,1,2,2-tetrachloroethane (e.g., CEPA 1993; Harte et al. 1991). Several of these chemicals are themselves toxic and are the subjects of separate ATSDR profiles. Information on the availability of ATSDR profiles is available through the Internet World Wide Web (ATSDR 1996).

- Trichloroethylene (TCE) is widely used in industry as a degreasing and cleaning solvent. It is also used in the manufacture of PVC and is a component in a variety of paints, lacquers, varnishes, and adhesives. It is a common carrier (a socalled inert ingredient) for insecticides and fungicides. TCE is quite soluble in water, and has been found in many groundwater supplies. Further information is available in ATSDR profile TP-9209 (ATSDR 1996).

- 1,1,2-Trichloroethane, which closely resembles the more widely used 1,1,1-trichloroethane, is the feedstock used to make 1,2-dichloroethene (DCE or vinylidene chloride) (see below). Further information is available in ATSDR profile TP-89/24 (ATSDR 1996).

- 1,2-Dichloroethene (DCE or vinylidene chloride) is used in various plastics, acrylic fabrics, backing materials, resins, and glues. 1,1,2-Trichloroethane is a feedstock used to make DCE. DCE is considered a hazardous air pollutant and could be of concern to people living near plants where it is manufactured. Further information is available in ATSDR profile TP-95/04 (ATSDR 1996).

- Tetrachloroethylene (perchloroethylene, PCE or PERC) is the most widely used dry cleaning solvent. It is also an important industrial degreasing agent. At least 300,000 tons are used each year in the United States. It is also used in homes as a spot remover, paint stripper, and cleaner, and in the textile industry for fabrics and rugs. It is a component of vinyl-coated asbestos-cement pipes used in large water mains. It is also used to make chlorofluorocarbons (CFCs). Further information is available in ATSDR profile TP-92/18 (ATSDR 1996).

- Vinyl chloride is the chemical used to make polyvinyl chloride (PVC), one of the most widely used plastics products. 1,1,2,2-Tetrachloroethane appears as a trace constituent in batches of vinyl chloride monomer. The waste by-products associated with the production of vinyl chloride may contain very high levels (up to 23% by weight) of 1,1,2,2-tetrachloroethane (CEPA 1993). Further information on vinyl chloride is available in ATSDR profile TP-92/20 (ATSDR 1996).

- 1,2-Dichloroethane or ethylene dichloride (EDC) is generated in the production of vinyl chloride. It has end-uses as an industrial solvent and was once used as a lead scavenger in leaded gasolines. The waste by-products associated with the production of EDC may contain very high levels (up to 23% by weight) of 1,1,2,2-tetrachloroethane (CEPA 1993). Further information on EDC is available in ATSDR profile TP-93/06 (ATSDR 1996).

- 1,1,1-Trichloroethane (or methyl chloroform) is one of the most commonly used solvents in the United States. It is also used in the manufacture of 1,2- dichloroethene (see above). Further information on 1,1,1-trichloroethane is available in ATSDR profile TP-9400 (ATSDR 1996).

4.4 DISPOSAL

1,1,2,2-Tetrachlorethane disposal should follow the Resource Conservation and Recovery Act (RCRA) regulations appropriate for halogenated organic compound (HOC) wastes, which are likely to contain greater than 1,000 ppm of HOCs (EPA 1988, 1989). Selection of an appropriate technology for waste treatment and disposal depends on the RCRA waste code number. RCRA defines five main categories of wastes. Waste code U209 is specifically assigned to 1,1,2,2- tetrachloroethane, but wastes containing 1,1,2,2-tetrachloroethane could be assigned to one or more of 25 halogenated organic wastes under the RCRA U and P waste series.

For these U and P series wastes, the EPA has proposed three treatment technologies as alternative Best Demonstrated Available Technology (BDAT) treatment standards: (1) wet air oxidation followed by carbon adsorption; (2) chemical oxidation followed by carbon adsorption; or (3) incineration of waste waters. The BDAT for these HOC waste types is incineration. Industrial boilers or furnaces that function like waste disposal incinerators (e.g., cement kilns) may also substitute the combustible wastes for their normal fuel stocks. However, EPA does not believe that fuel substitution is a viable alterative for the majority of class U (“off-spec” materials that may contain impurities or mixtures of other wastes) HOC products. Chapter 7 of this profile provides a comprehensive overview of federal or state laws and regulations related to 1 ,I ,2,2-tetrachloroethane.

The following categories of hazardous wastes include 1,1,2,2-tetrachloroethane as a hazardous constituent:

- process waste from the production of certain chlorinated aliphatic hydrocarbons (containing chains of 1 to 5 carbons);

- distillation light ends, spent filters, and spent desiccant generated in the production of certain chlorinated aliphatic hydrocarbons;

- wastes from the production of ethylene dichloride, vinyl chloride, trichloroethylene, perchloroethylene, chlorine, and 1,1,1-trichloroethane; and

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- off-specification 1,1,2,2-tetrachloroethane (i.e., 1 ,1,2,2-tetrachloroethane that does not meet desired chemical purity).

Only one of these categories of wastes (process waste from the production of chlorinated aliphatic hydrocarbons) has an EPA-prescribed treatment standard before land disposal. Such wastes must be treated by incineration to comply with the restrictions. The other waste categories have concentrationbased standards which must be achieved before being sent to a RCRA-permitted land disposal facility (EPA 1988). The waste streams generated from the manufacture of vinyl chloride and ethylene dichloride have been noted in studies in both the United States and Canada to contain high levels of 1,1,2,2-tetrachloroethane (CEPA 1993). These waste streams are currently treated to recover and recycle many types of organic products prior to incineration, but trace amounts of 1,1,2,2-tetrachloroethane will remain, contributing to atmospheric emissions during the incineration disposal process, even assuming rates of destruction in excess of 99% (CEPA 1993).